

ALIGNMENT PROCEDURE

Marine Radio

MODEL: MRF75 /MRF55

REVISION: D

DATE : July. 12, 2004

FOR USA and EUROPE VERSION

TOTAL PAGES:

MRF75 / 55 ALIGNMENT INSTRUCTION

1.0 TEST CONDITION:

- 1.1. STANDARD DC POWER: 13.8VDC
 1.2. STANDARD AUDIO FREQUENCY: 1KHz
 1.3. STANDARD RF INPUT: 1mV
 1.4. MEASUREMENT CHANNEL: CH14 (156.700MHz)
 1.5. STANDARD AUDIO LOADING: 8 Ω
 1.6. ANTENNA IMPEDANCE: 50 Ω
 1.7. STANDARD REF. MODULATION: ± 3 KHz
 1.8. STANDARD REF. AUDIO OUTPUT: 500mW
 1.9. FREQUENCY TABLE:

WX CHANNEL FREQUENCY			
01	162.550	06	162.500
02	162.400	07	162.525
03	162.475	08	162.650
04	162.425	09	161.775
05	162.450	10	163.275

European Private Channels				
Country	CH NO.	TX (MHz)	RX (MHz)	Used for
UK	P1	157.850	157.850	
	P2	161.425	161.425	
Denmark	P3	155.500	155.500	
	P4	155.525	155.525	
Finland, Norway & Sweden	P3	155.500	155.500	
	P4	155.525	155.525	
	P5	155.650	155.650	
Holland	P1	157.850	157.850	
	P6	157.550	162.150	
Belgium	P6	157.550	162.150	
	P7	162.425	162.425	
Denmark, Finland, Norway & Sweden	P8	155.625	155.625	
	P9	155.775	155.775	
	P0	155.825	155.825	

Marine Radio frequency table list

date: Sept. 02, 2003

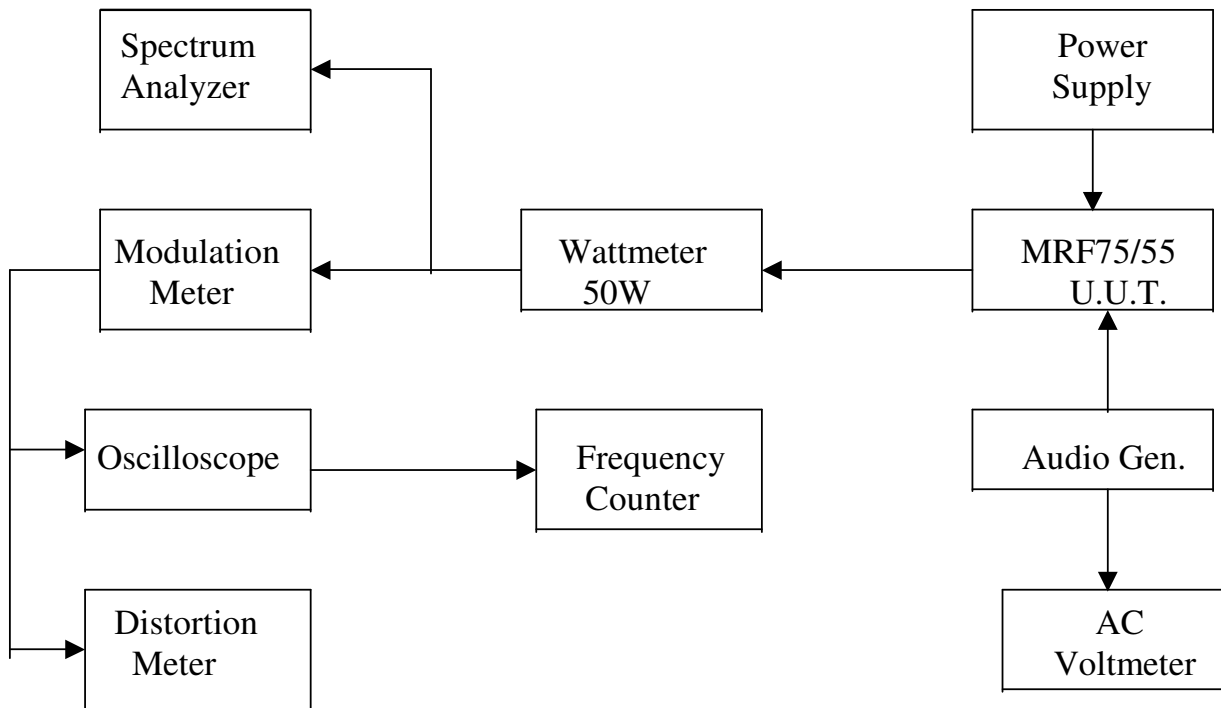
Channel Number	Channel Map			Frequency (MHz)			Power
	USA	Canada	Int'l	TX	RX	RX VCO	
01		X	X	156.050	160.650	139.250	
01A	X			156.050	156.050	134.650	
02		X	X	156.100	160.700	139.300	
03		X	X	156.150	160.750	139.350	
03A	X			156.150	156.150	134.750	
04			X	156.200	160.800	139.400	
04A		X		156.200	156.200	134.800	
05			X	156.250	160.850	139.450	
05A	X	X		156.250	156.250	134.850	
06	X	X	X	156.300	156.300	134.900	
07			X	156.350	160.950	139.550	
07A	X	X		156.350	156.350	134.950	
08	X	X	X	156.400	156.400	135.000	
09	X	X	X	156.450	156.450	135.050	
10	X	X	X	156.500	156.500	135.100	
11	X	X	X	156.550	156.550	135.150	
12	X	X	X	156.600	156.600	135.200	
13	X	X	X	156.650	156.650	135.250	1W for USA & CAN
14	X	X	X	156.700	156.700	135.300	
15	X			NO TX	156.750	135.350	
15		X	X	156.750	156.750	135.350	1W for INT & CAN
16	X	X	X	156.800	156.800	135.400	
17	X	X	X	156.850	156.850	135.450	1W FOR CAN
18			X	156.900	161.500	140.100	
18A	X	X		156.900	156.900	135.500	
19			X	156.950	161.550	140.150	
19A	X	X		156.950	156.950	135.550	
20	X	X	X	157.000	161.600	140.200	1W FOR CAN
20A	X			157.000	157.000	135.600	
21		X	X	157.050	161.650	140.250	
21A	X	X		157.050	157.050	135.650	
22			X	157.100	161.700	140.300	
22A	X	X		157.100	157.100	135.700	
23		X	X	157.150	161.750	140.350	
23A	X			157.150	157.150	135.750	

24	X	X	X	157.200	161.800	140.400	
25	X	X	X	157.250	161.850	140.450	
26	X	X	X	157.300	161.900	140.500	
27	X	X	X	157.350	161.950	140.550	
28	X	X	X	157.400	162.000	140.600	
60		X	X	156.025	160.625	139.225	
61			X	156.075	160.675	139.275	
61A	X	X		156.075	156.075	134.675	
62			X	156.125	160.725	139.325	
62A		X		156.125	156.125	134.725	
63			X	156.175	160.775	139.375	
63A	X			156.175	156.175	134.775	
64		X	X	156.225	160.825	139.425	
64A	X	X		156.225	156.225	134.825	
65			X	156.275	160.875	139.475	
65A	X	X	X	156.275	156.275	134.875	
66			X	156.325	160.925	139.525	
66A	X	X	X	156.325	156.325	134.925	1W FOR CAN
67	X	X	X	156.375	156.375	134.975	1W FOR USA
68	X	X	X	156.425	156.425	135.025	
69	X	X	X	156.475	156.475	135.075	
70	X	X	X	NO TX	156.525	135.125	
71	X	X	X	156.575	156.575	135.175	
72	X	X	X	156.625	156.625	135.225	
73	X	X	X	156.675	156.675	135.275	
74	X	X	X	156.725	156.725	135.325	
77	X	X	X	156.875	156.875	135.475	1W FOR CAN
78			X	156.925	161.525	140.125	
78A	X	X		156.925	156.925	135.525	
79			X	156.975	161.575	140.175	
79A	X	X		156.975	156.975	135.575	
80			X	157.025	161.625	140.225	
80A	X	X		157.025	157.025	135.625	
81			X	157.075	161.675	140.275	
81A	X	X		157.075	157.075	135.675	
82			X	157.125	161.725	140.325	
82A	X	X		157.125	157.125	135.725	
83		X	X	157.175	161.775	140.375	
83A	X	X		157.175	157.175	135.775	
84	X	X	X	157.225	161.825	140.425	

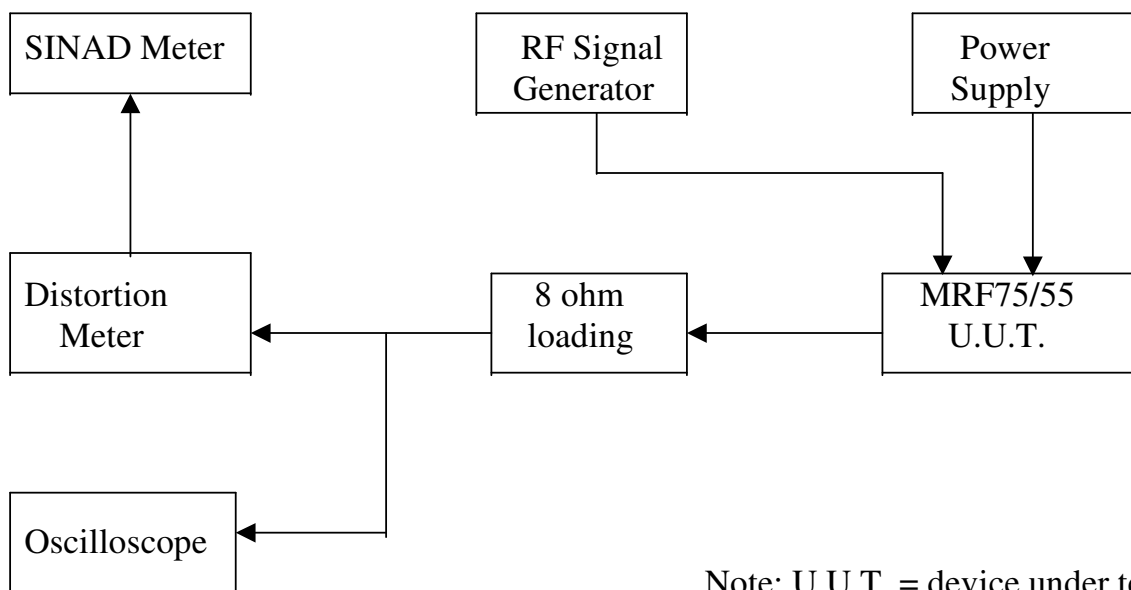
84A	X			157.225	157.225	135.825	
85	X	X	X	157.275	161.875	140.475	
85A	X			157.275	157.275	135.875	
86	X	X	X	157.325	161.925	140.525	
86A	X			157.325	157.325	135.925	
87	X	X	X	157.375	161.975	140.575	
87A	X			157.375	157.375	135.975	
88	X	X	X	157.425	162.025	140.625	
88A	X			157.425	157.425	136.025	

1.8. TEST EQUIPMENT SETUP AS BELOW:

A. TX test equipment setup:



B. RX test equipment setup:



Note: U.U.T. = device under test

2.0 Alignment Procedure.

2.1 VCO Adjust.

2.1.1 VCO Voltage Adjust: (Item1-3 for USA version; Item 4-6 for EU version)

1. Test point TP1 connect to the multi-meter, set UUT for USA RX mode CH01A.
2. Adjust IFT L115 for $1.2 \pm 0.1V$ on the Multi-meter read, then checking WX mode CH10 should be less than 3.8V.
3. Set UUT for Marine TX MODE : CH01A $\geq 1.5V$, CH88A $\leq 3.8 V$.
4. Test point TP1 connect to the multi-meter. In test mode, set UUT for RX mode CHP3.
5. Adjust IFT L115 for $1.0 \pm 0.1V$ on the Multi-meter read, then checking RX mode CHP7 should be less than 3.8V.
6. Set UUT for TX MODE : CHP3 $\geq 1.2V$, CHP7 $\leq 3.8 V$.

2.3 RX Section Alignment . (Marine and WX)

2.3.1 Audio Distortion Adjust:

1. UUT set to Marine mode CH14, output of RF signal generator connect to **TP4**. Audio dummy load connect to **TP11**. (@8 Ω load)
2. Set RF S.S.G Freq.: 21.400MHz, Mod.: $\pm 3KHz$, Fmod.: 1KHz, Output level:1mV.
3. Squelch Volume set to minimum position, volume control set to around middle position.
4. Adjust IFT L123 for maximum audio output and minimum distortion at the distortion meter. (distortion less than 5%).
5. Set volume control to maximum position, audio output power shall be more than 3 Watts. (Note: The audio volume of MRF75 is by electrical control, total 16 steps from minimum to maximum.)

2.3.2 Sensitivity Adjust:

1. RX RF bandwidth alignment: Apply Spectrum analyzer's Track Gen. Output connect to the UUT antenna terminal and input connect to the UUT TP15(S1), center frequency set 160MHz, span set 50MHz; Turn on the UUT DC power, adjust IFT L116, L117, L119 & L120 refer to attached table curve, then short TP15 & TP18 (S1 & S2).
2. UUT set to Marine mode CH14, output of RF signal generator connect to **TP9**.
3. Set RF S.S.G Freq.: 156.700MHz, Mod.: $\pm 3KHz$, Fmod.: 1KHz, Output level:0.25uV.
7. Adjust the volume control for 2V output on distortion meter read.
8. Adjust L116, L117, L119 & L120 for more than 12dB at SINAD meter.
9. Repeat as needed. Check all channels sensitivity must met the D.T.S. specifications.

2.3.2.1 Sensitivity Adjust for DSC small board

1. Connect ANT to frequency counter and tune VC1, frequency must be 156.0912MHz.
2. Connect ANT to S.S.G, set RF S.S.G frequency: 156.525MHz, Mod: 3KHz, Fmod: 1KHz, output level: 1mV .
3. Adjust L5 for distortion MIN, and AF level MAX. AF level >100mV(PCB),>50mV(casing)
4. Reduce RF S.S.G output level to 2uV(-101dBm), adjust L2, L3 for 12dB at SINAD metter. (casing test)

2.3.3 T- Squelch Sensitivity Adjust:

1. UUT set to Marine mode CH14, output of RF signal generator to antenna input terminal.
2. Set RF S.S.G Freq.: 156.700MHz, Mod.: ± 3 KHz, Fmod.: 1KHz, Output level: -110dBm.
3. Volume control and Squelch control set to maximum position, (C.W)
4. Adjust the VR105 to mute the speaker, then turn the RF S.S.G. output level to -107dBm.
5. Slowly turn **VR105** to a position that the audio output on the speaker just appears from no output. Turn the RF S.S.G. output level to -113dBm, the audio must be off from the speaker.

2.3.4 RX Signal Meter Display Adjust:

1. UUT set to Marine mode CH14, output of RF signal generator to antenna input terminal.
2. Turn the RF S.S.G output for **30dB** on the SINAD meter showing.
3. Adjust VR104 for 9 characters displayed at the RX signal strength of the LCD.

2.3.5 Maximum S/N Detector : (SQUELCH set MINIMUM)

1. UUT set to Marine mode CH14, output of RF signal generator to antenna input terminal.
2. Set RF S.S.G Freq.: 156.700MHz, Mod.: ± 3 KHz, Fmod.: 1KHz, Output level: 1mV.
3. The Volume control turn to 0.5 watts audio output for reference A dB.
4. Then off the Modulation, here the audio output for reference B dB. $S/N \geq 42$ dB.

2.3.6 DSC Decoder Detector.

1. UUT set to Marine mode CH14, output of RF signal generator to antenna input terminal.
2. Set RF S.S.G Freq.: 156.700MHz, Mod.: ± 1 KHz, Fmod.: 1300Hz, Output level: 1uV.
3. Test point **TP3** connect to the oscilloscope, check the TP3 output DC level should be Hi on the oscilloscope screen (around 4.5V).
4. Then change the S.S.G Fmod. to 2100Hz, check the DC level should be low.

2.3.7 WX Alert Decoder Frequency Alignment. --- USA VERSION ONLY

Turn on the UUT, set WX mode, adjust VR108 for 1050Hz \pm 1Hz output at **TP2**.

2.3.8 GPS receive detector & USE GPS TERMINAL WRITE THE EUROPE VERSION PRIVATE CHANNELS BY PC SOFTWARE CONTROL.

1. Connect the GPS output to the UUT's GPS input terminal, LCD display should be showing the correct longitude and latitude data.
2. Program the Europe private channel: The UUT under the test mode, press "UIC" key, will show "program mode" on the LCD display. Then write the private channels to the UUT through computer software controller. If successfully write down, you will hear two sounds "di, di" from UUT speaker.

2.4 TX Section Alignment.

2.4.1 TP16 and Frequency Alignment:

1. UUT set to Marine mode CH14, TP16 connect to RF power-meter input terminal. Note, please don't assembly the RF power module before alignment TP16.
2. Set UUT to TX mode, check the output TX power should be more than 14dBm.
3. Adjust the trimmer capacitor VC100 to 156.700000MHz \pm 10Hz on frequency counter.

2.4.2 TX Output Power Alignment and APC Function Detector.

1. UUT set to Marine mode CH14, input of power-meter to antenna input terminal.
2. Set UUT to TX Hi power mode, adjust the VR101 for 25 watts power output.
3. Set UUT to TX low power mode, adjust the VR102 for 1 watt power output.
4. Check all channels should be met the DTS specification.
5. TX Automatic Power Control (APC) detector: The TX output power drift must be within \pm 0.2watt when fine turn the DC power supplier from 12.5 to 15.0V

2.4.3 TX Signal Meter Indicator Alignment.

3. UUT set to Marine mode CH14, input of power-meter to antenna input terminal.
4. Set UUT to TX low mode, adjust the VR100 for "two" characters displayed at the TX signal strength of the LCD display.
5. Set UUT to hi power mode, check the signal indicator should be full bars display at the LCD.

2.4.4 TX modulation Deviation Alignment and DSC data detection:

1. UUT set to Marine mode CH14, input of power-meter to antenna input terminal. Input of MIC socket to the audio frequency signal generator output terminal.
2. Set audio frequency signal generator @ FREQ.: 1000Hz Output level: 500mVrms.
Note: The AF signal O/P to UUT between should be add one 10uF capacitor in series.
3. Set UUT to TX Low power mode, adjust VR103 for 4.7KHz deviation on modulation meter for **MRF55**. *Adjust VR103 for 4.7KHz deviation on modulation meter for **MRF75**.*
4. Decrease the AF output level. Check the 3KHz deviation modulation sensitivity should be between 2-8 mV for **MRF55**; *Check the 3KHz deviation modulation sensitivity should be between 2-10 mV for **MRF75**;*
5. Decrease the AF output level for 2.5KHz deviation on modulation meter, check the modulation distortion must be less than 5.0% on the audio distortion meter.
6. On test mode, press the "distress" key will send out 2.1KHz data, press the "distress" key again will send out 1.3KHz data, third press the "distress" key exit DSC data detect.

2.4.5 TX Second Harmonic Detect.

1. UUT set to Marine mode CH14, input of power-meter to antenna input terminal.
2. Set UUT to TX Hi power mode, the second harmonic (313.7XXMHz) must be less than -55dB refer to fundament carrier 156.700MHz.
3. All channels should be met the DTS specification.

3.0 TEST MODE DESCRIPTION:

1. Press both keys “Channel Down” & “Scan” synchronously, then turn on the DC power enter test mode, the LCD will show the model number, software version and checksum.
2. Press the “channel up” key can select USA CH01, CH14, CH88 and WX CH10 four channels for USA version. Press the “channel up” key can select CHP3, CH14 and CHP7 three channels for Europe version.
3. Press “UIC” key enter European country channel programmable.
4. Press “scan” key to checking the LCD display’s all segments and icons.
5. Press “16/9” key eliminate all setting, reset the unit to default setting.
5. First press the “distress” key will send out data 2.1KHz and TX turn on; Second press the “distress” key send out data 1.3KHz; Third press the “distress” key exit DSC data test.
6. Press “call/set” exit test mode.

